UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

June 20, 2006

FISH & RICHARDSON PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022
US

Dear Sir/Madam,

Your refund request for 10726071 in the amount of $1,750.00 has been denied .

Claims withdrawn cannot be refunded.

Sincerely,

VINCENT STUART
Technical Center Others
703 308-9210 x119

Finance

Attorney Docket: 08919-109001 / 07A-920505

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Huan-Cheng Chang et al. Art Unit : 2881
Serial No. : 10/726,071 Examiner : Johnnie L. Smith
Filed : December 1, 2003
Title : NANOPARTICLE ION DETECTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR REFUND

On February 27, 2006, an excess claims fee in the amount of $1,750.00 was charged to Fish & Richardson's Deposit Account No. 06-1050, attorney docket 08919-109001. A copy of the deposit account statement is attached. The reason for the charge is that, in the reply previously submitted on February 21, 2006, the applicant inadvertently withdrew claims that were meant to be canceled, resulting in excess claims.

A supplemental reply is being submitted to correct the status of the claims. Claims 1-29 and 32-73 have been canceled. The applicant respectfully requests that the charge of $1,750.00 be refunded to Fish & Richardson's Deposit Account No. 06-1050, reference 08919-109001, as a credit.

Respectfully submitted,

Date: 4/19/2006

Rex Huang
Rex I. Huang
Reg. No. 57,661

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Telephone: (617) 542-5070
Facsimile: (617) 542-8906
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Signature

Jamie Kelaher
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02/27	11	09578108		9204	-$205.00	$1
02/27	12	09578108		1252	$410.00	$1

Finance ~~Dep & Ref~~

Attorney Docket: 08919-109001 / 07A-920505

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Huan-Cheng Chang et al.	Art Unit	: 2881
Serial No.	: 10/726,071	Examiner	: Johnnie L. Smith
Filed	: December 1, 2003		
Title	: NANOPARTICLE ION DETECTION		

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUPPLEMENTAL REPLY TO ACTION DATED NOVEMBER 18, 2006

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Jamie Kelaher
Signature

Jamie Kelaher
Typed or Printed Name of Person Signing Certificate

Amendments to the claims (this listing replaces all prior versions):

1-29. (canceled)

30. (original) A method comprising:

selectively ejecting ions out of a mass selection device based on mass-to-charge ratios of the ions;

using an ion trap to collect the ions ejected from the mass selection device;

detecting light emitted from the ions in the ion trap to generate a detection signal; and

correlating the detection signal with characteristics of the mass selection device to determine a mass spectrum on the ions in the ion trap.

31. (original) The method of claim 30, further comprising directing a laser toward ions in the ion trap to induce fluorescence, and detecting light emitted from the ions comprises detecting the fluorescence emitted from the ions.

32-73. (canceled)

74. (previously presented) The method of claim 30 in which the mass selection device comprises an ion trap.

75. (previously presented) The method of claim 30, further comprising applying a first time-varying signal to the mass selection device, and sweeping a frequency of the first time-varying signal from a first frequency to a second frequency to cause particles having different mass-to-charge ratios to be ejected from the mass selection device at different frequencies of the first time-varying signal.

76. (previously presented) The method of claim 75 in which the frequency of the first time-varying signal is scanned according to a non-linear function of time so that the mass-to-charge ratios of the particles ejected from the mass selection device comprises a linear function of time.

77. (previously presented) The method of claim 75, further comprising applying a second time-varying signal to the ion trap that collects the ions ejected from the mass selection device, and sweeping a frequency of the second time-varying signal based on the sweeping of the frequency of the first time-varying signal.

78. (previously presented) The method of claim 30 in which at least some of the ions that are detected have dimensions larger than 10 nm.

79. (previously presented) The method of claim 30 in which at least some of the ions that are detected have masses larger than 1,000,000 Dalton.

80. (previously presented) The method of claim 30 in which at least some of the ions that are detected have mass/charge ratios larger than 1,000,000.

81. (previously presented) The method of claim 30, further comprising ejecting the ions from the ion trap at selected time periods.

82. (previously presented) The method of claim 81 in which ejecting the ions from the ion trap is selected so that the light that is detected between two ejections of the ions represents an amount of ions having mass-to-charge ratios within a particular range

83. (previously presented) The method of claim 30, further comprising applying a time-varying voltage signal to the ion trap that collects the ions.

84. (previously presented) The method of claim 83, further comprising scanning a frequency of the time-varying voltage signal to tend to keep the ions collected by the ion trap in the ion trap.

85. (previously presented) The method of claim 84 in which the frequency of the time-varying voltage signal is scanned so as to maintain a trap parameter (q_z) of the ion trap substantially constant with respect to the particles collected by the ion trap.

86. (previously presented) The method of claim 85 in which the trap parameter q_z is proportional to the amplitude of the time-varying voltage signal and inversely proportional to the square of the frequency of the time-varying voltage signal.

87. (previously presented) The method of claim 30 in which the ions ejected out of the mass selection device have velocities that vary according to a predetermined function of time.

88. (previously presented) The method of claim 87, further comprising generate a time-varying electromagnetic field in the ion trap, and scanning a frequency of the time-varying electromagnetic field to tend to keep the ions in the ion trap.

89. (previously presented) The method of claim 88 in which the scanning of the frequency of the time-varying electromagnetic field is based on the predetermined function of time.

90. (previously presented) The method of claim 30 in which the characteristics of the mass selection device comprise a relationship between mass-to-charge ratios of particles ejected from the mass selection device and a time-varying control signal applied to the mass selection device.

91. (previously presented) The method of claim 30, further comprising applying a time-varying signal to the ion trap to generate a time-varying electromagnetic field to keep the ions within the ion trap.

92. (previously presented) The method of claim 91, further comprising turning off the time-varying signal at selected time periods to remove substantially all of the ions from the ion trap.

93. (previously presented) The method of claim 91, further comprising applying a direct-current voltage signal to the ion trap at selected time periods to induce an electromagnetic field that facilitates removal of the ions from the ion trap.

94. (previously presented) The method of claim 30 in which detecting the fluorescence comprises counting photons emitted from the ions.

95. (previously presented) The method of claim 30, further comprising directing a laser to a sample to ionize particles and supplying the particles to the mass selection device.

96. (previously presented) The method of claim 30, further comprising using electrospray ionization to generate the ions and supplying the ions to the mass selection device.

97. (previously presented) The method of claim 30, further comprising using photo-ionization to generate the ions and supplying the ions to the mass selection device.

98. (previously presented) The method of claim 30, further comprising directing a laser beam towards the ions in the ion trap, the laser beam having a wavelength selected to induce fluorescence from the ions.

99. (previously presented) The method of claim 30, further comprising tagging the ions with fluorescent dye molecules.

100. (previously presented) The method of claim 30, further comprising tagging the ions with more than one type of fluorescent dye molecules that emit fluorescence having different wavelengths.

101. (previously presented) The method of claim 100, further comprising illuminating the ions collected at the ion trap using a light beam with components having different wavelengths that are selected to induce fluorescence having different wavelengths from the different types of fluorescent dye molecules.

102. (previously presented) The method of claim 101, further comprising generating a mass spectrum for each group of particles tagged with a particular type of fluorescent dye molecules.

103. (previously presented) The method of claim 30, further comprising selectively applying a direct-current voltage signal to the ion trap to cause the ions to be ejected from the ion trap.

104. (previously presented) The method of claim 103 in which the polarity of the direct-current voltage depends on the polarity of the charges of the ions.

105. (previously presented) The method of claim 104, further comprising applying a time-varying voltage signal to the ion trap to create a time-varying electromagnetic field in the ion trap.

106. (previously presented) The method of claim 105, further comprising selectively turning off the time-varying voltage signal when the direct-current voltage signal is applied to the ion trap.

107. (previously presented) An apparatus comprising:

a mass selection device to selectively eject charged particles based on mass-to-charge ratios of the charged particles;

an ion trap to receive the charged particles ejected from the mass selection device;

a detector to detect light emitted from the charged particles in the ion trap to generate a detection signal; and

a data processor to correlate the detection signal with characteristics of the mass selection device to determine a mass spectrum on the charged particles in the ion trap.

108. (previously presented) The apparatus of claim 107 in which the mass selection device comprises an ion trap.

109. (previously presented) The apparatus of claim 107 in which the ion trap comprises a ring electrode, a first end-cap electrode, and a second end-cap electrode, the charged particles entering the ion trap through a hole in the first end-cap electrode and exiting the ion trap through a hole in the second end-cap electrode.

110. (previously presented) The apparatus of claim 107, further comprising a signal generator to generate a time-varying voltage signal, which when applied to the ion trap, generates a time-varying electromagnetic field in the ion trap to cause the particles ejected from the mass selection device to be trapped in the ion trap.

111. (previously presented) The apparatus of claim 107 in which the detector comprises a photomultiplier tube.

112. (previously presented) The apparatus of claim 107 in which the charged particles are fluorescent.

113. (previously presented) The apparatus of claim 107 in which the charged particles are tagged with fluorescent dye molecules.

114. (previously presented) The method of claim 107 in which at least some of the charged particles that are detected have dimensions larger than 10 nm.

115. (previously presented) The method of claim 107 in which at least some of the charged particles that are detected have masses larger than 1,000,000 Dalton.

116. (previously presented) The method of claim 107 in which at least some of the charged particles that are detected have mass/charge ratios larger than 1,000,000.

117. (previously presented) The apparatus of claim 107, further comprising a laser source to generate a laser beam that is directed towards the particles in the ion trap.

118. (previously presented) The apparatus of claim 117 in which the laser beam has a wavelength selected to induce fluorescence from the charged particles.

119. (previously presented) The apparatus of claim 107, further comprising a signal generator to generate a time-varying signal that is applied to the mass selection device.

120. (previously presented) The apparatus of claim 119 in which the signal generator scans a frequency of the time-varying voltage signal from a first frequency to a second frequency during a measurement cycle to cause particles to be selectively ejected from the mass selection device based on mass-to-charge ratios of the particles.

121. (previously presented) The apparatus of claim 119 in which the signal generator scans a frequency of the time-varying voltage signal so that the frequency changes according to a non-linear function of time designed so that the particles ejected out of the mass selection device during the measurement cycle have mass-to-charge ratios that vary as a linear function of time.

122. (previously presented) The apparatus of claim 107, further comprising a circuit to generate a control voltage that is applied to the ion trap to cause the ion trap to eject particles at selected times.

123. (previously presented) The apparatus of claim 122 in which the ejections of particles are spaced apart for at least a specified time period to allow the detector to detect the light from the particles.

124. (previously presented) The apparatus of claim 107, further comprising a signal generator to generate a voltage signal that is selectively applied to the ion trap to cause the charged particles in the ion trap to be ejected from the ion trap.

125. (previously presented) The apparatus of claim 124 in which the voltage signal comprises a direct-current voltage signal.

126. (previously presented) The apparatus of claim 107, further comprising a signal generator to generate a time-varying voltage signal that is applied to the ion trap that receives the charged particles.

127. (previously presented) The apparatus of claim 126 in which the signal generator scans a frequency of the time-varying voltage signal to tend to keep the charged particles received by the ion trap in the ion trap.

128. (previously presented) The apparatus of claim 126 in which the signal generator scans a frequency of the time-varying voltage signal so as to maintain a trap parameter (q_z) of the ion trap substantially constant with respect to the particles received by the ion trap.

129. (previously presented) The apparatus of claim 128 in which the trap parameter q_z is proportional to the amplitude of the time-varying voltage signal and inversely proportional to the square of the frequency of the time-varying voltage signal.

130. (previously presented) The apparatus of claim 126 in which the charged particles ejected out of the mass selection device have velocities that vary according to a predetermined function of time.

131. (previously presented) The apparatus of claim 130 in which the signal generator scans the frequency of the time-varying control signal based on the predetermined function of time.

132. (previously presented) The apparatus of claim 107, further comprising

a first signal generator to generate a time-varying voltage signal that is applied to the ion trap to create a time-varying electromagnetic field in the ion trap, and

a second signal generator to generate a dumping voltage signal that is selectively applied to the ion trap to cause the charged particles to be ejected from the ion trap.

133. (previously presented) The apparatus of claim 132 in which the first signal generator selectively turns off the time-varying voltage signal when the dumping voltage signal is applied to the ion trap.

134. (previously presented) An apparatus comprising:

mass selecting means for selectively ejecting charged particles based on mass-to-charge ratios of the charged particles;

receiving means for receiving the charged particles ejected from the mass selecting means;

detecting means for detecting light emitted from the charged particles in the receiving means to generate a detection signal; and

data processing means for correlating the detection signal with characteristics of the mass selecting means to determine a mass spectrum of the charged particles in the receiving means.

135. (previously presented) The apparatus of claim 134 in which the mass selecting means comprises an ion trap.

136. (previously presented) The apparatus of claim 134 in which receiving means comprises an ion trap.

137. (previously presented) The apparatus of claim 134, further comprising a laser source to direct a laser beam towards the charged particles in the receiving means to induce fluorescence that is detected by the detecting means.

138. (previously presented) The apparatus of claim 134, further comprising a signal generator to generate a time-varying voltage signal that is applied to the receiving means.

139. (previously presented) The apparatus of claim 138 in which the time-varying voltage signal generates a time-varying electromagnetic field in the receiving means to cause the particles ejected from the mass selecting means to be trapped in the ion trap.

140. (previously presented) The apparatus of claim 134, further comprising a signal generator to generate a time-varying signal that is applied to the mass selecting means.

141. (previously presented) The apparatus of claim 140 in which the signal generator scans a frequency of the time-varying voltage signal from a first frequency to a second frequency during a measurement cycle to cause particles to be selectively ejected from the mass selecting means based on mass-to-charge ratios of the particles.

142. (previously presented) The apparatus of claim 140 in which the signal generator scans the frequency of the time-varying voltage signal so that the frequency changes according to a non-linear function of time designed so that the particles ejected out of the mass selecting device during the measurement cycle have mass-to-charge ratios that vary as a linear function of time.

143. (previously presented) The apparatus of claim 134 in which the detecting means a photomultiplier tube.

144. (previously presented) The apparatus of claim 134, further comprising

a first signal generator to generate a time-varying voltage signal that is applied to the receiving means to create a time-varying electromagnetic field in the receiving means, and

a second signal generator to generate a dumping voltage signal that is selectively applied to the receiving means to cause the charged particles to be ejected from the receiving means,

wherein the first signal generator selectively turns off the time-varying voltage signal when the dumping voltage signal is applied to the receiving means.

REMARKS

Claims 1-29 and 32-73 have been canceled. The applicant submits that all pending claims are in condition for allowance.

Please apply any credits to deposit account 06-1050, reference 08919-109001.

Respectfully submitted,

Date: 4/19/2006

Rex Huang
Rex I. Huang
Reg. No. 57,661

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

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Finance

Attorney Docket: 08919-109001 / 07A-920505

PATENT MAINTENANCE DIVISION

2006 MAY 12 PM 3:11

US PATENT & TRADEMARK OFFICE

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Huan-Cheng Chang et al.	Art Unit	:	2881
Serial No.	: 10/726,071	Examiner	:	Johnnie L. Smith
Filed	: December 1, 2003			
Title	: NANOPARTICLE ION DETECTION			

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

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Respectfully submitted,

Date: 4/19/2006

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Boston, MA 02110
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Jamie Kelaher
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